

## What is the ideal time for hip sonography screening?

Hip sonography screening

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### Abstract

**Aim:** The necessity of hip sonography scan is accepted by all authors. However, there is no clear information about when the scan is required. In this study, we tried to find out the most appropriate time for screening and reported our results of hip sonography performed in our clinic. **Materials and Methods:** Records of 351 infants were retrospectively investigated, and spontaneous correction in developmentally retarded hips was evaluated by Graf's method. Ages of infants were between 3-29 days; the average age was 11 days. **Results:** Three hundred and eighty hips were evaluated as type 1 (%54). Babies who were evaluated at three and four weeks of age, the ones that assessed as types 2c, d, 3 and 4 got initial treatment. Fourteen hips of 11 babies received treatment. All of the type 2a+ (71 hips) and all but two of type 2a- (82, %97.6) had become type 1 without treatment. Among 11 hips that were type 3 at week one, 3 type 3 hips of two babies that came back for control, returned to normal without treatment. Even the hips considered type 2c in this age group can return to normal without treatment. **Discussion:** According to our dataset, because hips that were evaluated as undeveloped at the first screening returned to normal at an average of 7 weeks, the ideal time for screening is 7th week of life.

### Keywords

Hip; Ultrasound; DDH; Graf's Method; Time

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Introduction

Developmental dysplasia of the hip (DDH) is an important disease which causes many comorbidities especially osteoarthritis [1-5]. Although there is no exact statistical data, developmental dysplasia of the hip (DDH) is seen at a frequency between 0.5% and 1.5% in Turkey [6]. On the other hand, studies using hip ultrasonography reported the frequency of this condition as 0.86%-17% in our country [7,8]. When not diagnosed and treated early, DDH is known to cause serious morbidity and therefore additional treatment costs. An important portion of the total hip replacements in our country occur against the background of DDH.

The necessity of hip sonography scan is accepted by all authors. However, there is no clear information about when the scan is required. In this study, we tried to find out the ideal time for hip sonography screening.

Materials and Methods

Among the infants screened in our clinic, 702 hips of 351 infants that received the scan at 0-1 months of age were examined.

Babies screened in our clinic are followed up in the way described below. First, information is given to parents about developmental dysplasia of the hip and about the procedure to be followed. Risk factors related to baby and the family were questioned. The physical examination has been performed after sonography so that babies did not cry. Hip sonography has been performed and alpha and beta angles were measured according to the Graf method. Data of babies that received hip sonography have been noted into the registration form and parents were informed about the results.

When the records were examined retrospectively it was seen that all of the babies who received screening at one or two weeks of age, except for type 1 babies, were called for control. Again, according to our clinical practice, among the babies that were found undeveloped no treatment was given to the ones at their first 2 weeks of age because of emergent compliance problems, instead, we waited them to be at least 3 weeks of age. Babies who were evaluated at three and four weeks of age, the ones that assessed as type 2c, typed, type 3 and type 4 received initial treatment while type 2a+ and 2a- ones were decided to be monitored and called for control. The Pavlik harness was preferred in the treatment. The Pavlik harness was placed by us in front of families, and signs were placed at strap points for convenience. To understand the treatment compliance and make sure that the families understood the method, patients were called for follow-up after 1 week. Infants who started receiving treatment were called for follow-up every 2 weeks and the treatment continued until type 1 hip was obtained. Except for 2 babies, no other treatment than Pavlik harness was needed; in those 2 babies, closed reduction under general anesthesia was performed and pelvipedal hip spica cast was used. Cast treatments were renewed after 6 weeks and at the end of the 3rd month, they were removed and abduction orthosis was given. The treatment was terminated after three months.

Statistical comparisons were made in 95% confidence interval, the Student's t-test was used for parametric data, and the Chi-square test was used in non-parametric data. Windows 2003 /

SPSS 12.0 program was used for statistical analysis.

Results

Among 702 hips of 351 infants that were included in the study, 380 hips were evaluated as type 1 according to Graf's sonographic classification, 119 hips were evaluated as type 2a+, 138 hips were 2a-, 49 hips were type 2c, 2 hips were type d, 11 hips were type 3a and 3 hips were type 4. The distribution of ages of those hips is shown in Table 1.

The follow-up of 128 hips could not be performed because the infants did not come for control. Of all the babies that came for control, 71 infants with 2a+ type detected on the first ultrasound, turned into type 1 without treatment (%100). Eighty-four type 2a- hips that were followed up turned into normal without treatment (%97). Two babies were treated with Pavlik harness and got their first sonography at 4 weeks of age.

Thirty-three of 45 hips that received first sonography at the age of 1 or 2 weeks and evaluated as type 2c came for control and 29 of them returned to normal without treatment (%87). Four babies that were screened at the age of 3 weeks and evaluated as type 2c received treatment, and among 3 babies that came back for the follow-up, 2 were treated with Pavlik harness while 1 of them was treated after receiving a closed reduction in the operating room after Pavlik harness.

Two babies were considered as type d at the first two weeks one of them did not come back for control. The other one that was followed up was found to be type d when he came back at the 6th week, and was treated with Pavlik harness. Of the 11 hips with type 3 at week one, 8 did not come back for control, 3 hips of two babies with type 3 that came back for control, became normal without treatment. One of two babies identified as type 4 at the first week did not come for control, while the other one was evaluated as type 3a at the 5th week and treated with closed reduction following Pavlik harness. One baby was identified as type 4 at four weeks of age and the treatment was given, but that baby could not be followed up. In this way, the treatment was given to 14 hips of 11 babies and among these

Table 1. Hip Types And Number According to Age

	Type 1	Type 2a(+)	Type 2a(-)	Type 2c	Type D	Type 3	Type 4
1 week	184	64	79	29	1	11	2
2 weeks	99	43	45	46	1	-	-
3 weeks	16	7	7	4	-	-	-
4 weeks	81	5	7	-	-	-	1

Table 2. Number of Babies Among The Ones Classified As Non-Type 1 in Their First Evaluation at 1 or 2 Weeks of Age and Came Back for Control Who Required No Treatment.

	Type 2a(+)	Type 2a(-)	Type 2c	Type 3
Number	68/68	75/75	29/33	3/3
Percentage	100	100	87	100

we completed treatment of 12 hips of 9 babies. Only two babies needed closed reduction and pelvic spica cast. Hips that recovered without treatment are shown in Table 2.

Among 142 babies that were evaluated as type 2a-, 2c, d, 3 and 4, 61 were male and 81 of them were female (%43 - %57). Fourteen babies had positive either first- or second-degree family history (%10). Thigh pili asymmetry was found in 49 babies (%35), 26 babies (%19) had limited abduction, 4 babies were born with breech presentation.

Eight of the babies who received treatment were female and 3 of them were male (%72-%28). Three of them had a family history (28%), 5 had pili asymmetry (45%), 3 had limited abduction (%28), 1 had breech presentation history.

When we look at our dataset with the weighted average, hips that were evaluated as displaced at the first screening returned to normal at an average of 7 weeks, and when the whole data are handled, the average time for screening was found to be 4 weeks. This result is not a test result, it is a detection.

## Discussion

Although it is not clearly defined when to do hip sonography in DDH screening, it is stated that it would be appropriate to screen at 4-6 weeks [9]. Bialik et al. stated that only 10% of hip pathologies that were detected at the first and third day of life persisted at the end of 6 weeks [10]. In this study, we found out that in all age groups, type 2a+ hips returned to normal. Again, we saw that all type 2a- hips that were detected by sonography performed in the first 3 weeks of life, returned to normal. According to the results of the fourth-week sonography, 2 of 7 babies that were identified as type 2a- needed treatment. If we look at the results obtained in the babies with hips identified as type 2a- or worse in the first two weeks, we will see that when these patients came back for control at the fifth and sixth weeks, only 5% of them had persistent pathology. According to our statistical study, it took an average of 5,5 weeks (39 days) for these hips to become type 1. According to the results, in the third and fourth-week, pathology was persistent at a rate of 36%. In the light of these findings, even if any pathology is found at sonography screening at the first two weeks, we believe that treatment is unnecessary.

Okur et al. found limited abduction in 26% of the babies that had pathology in sonography, while 17% of them had pili symmetry [11]. Tonnis et al. reported that limited abduction was the most frequently seen clinical finding in babies that had pathology in their ultrasound scans [8]. In our study, when type 2a- and worse hips were considered as "pathological", the most frequent clinical finding was pili asymmetry (%35). Limited abduction was the second most frequent finding (19%). However, 21% of the babies, who were evaluated as type 1 in ultrasound, also had pili asymmetry. However, we would like to state that these findings were viewed by more than one hand, and are not standardized enough.

In hip sonography screening, family history, breech presentation, and foot problems have been reported as the most common risk factors [12,13]. Oguz et al. in their series with 1099 cases, put emphasis on the first baby in DDH risk factors [14]. Omeroglu et al. reported the incidence of DDH in babies with and without risk factors for DDH as 28.1%-8.1% respectively

[15].

As it is well known, there are many risk factors for this condition [16]. In our study, family history ranks first (10%). This was followed by the breech presentation. On the other hand, Atalar et al. pointed out that maternal height and infant body mass index are also possible risk factors for developmental dysplasia of the hip in female infants [17].

Omeroglu et al. reported female/male ratio as 16/9 in babies with sonographic pathology [15]. In our study, among the babies that were evaluated as type 2a- and worse in the first inspection, 43% were male while 57% were female. However, in the second inspection, among the group with persistent pathology, female/male ratio was found to be 8/3 and we concluded that compared to the first case, female/male ratio increased dramatically.

In a study published recently, Gokharman et al. has investigated the same question as our study using a different method and they found 8th week as the ideal time for screening which is a similar to the result of our study [18].

In total, 128 hips, 18% of all hips did not come for control. Of these, 23 were hip type 2c and worse, which corresponds to a higher number than the number of hips we treated. When we performed ultrasonography and found pathological results, in the first month especially in the first two weeks, although we informed families in detail, and told them that this situation will most probably recover, and they must come back for control, we experienced significant losses. We later contacted these families by telephone and learned that most of them admitted to another center.

Eventually, we identified hip dysplasia that does not require treatment, with ultrasound performed in the first two months. Graf et al. reported that surgical treatment rate was 0% in babies with DDH who were diagnosed and received treatment [19]. However, we do not think that all of them have to receive initial treatment. There is no doubt that we should start treatment for type 2c and worse hips when we see them at the third of fourth weeks. In the first and second week, we recommend follow-up without treatment. We believe that in type 2a hips, treatment plan should be determined at follow-up in the sixth week.

According to our dataset, because hips that were evaluated as undeveloped at the first screening returned to normal at an average of 7 weeks, the ideal time for screening is 7th week of life. However, new studies with much more wider series may be required.

## Scientific Responsibility Statement

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

## Animal and human rights statement

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.*

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## Conflict of interest

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